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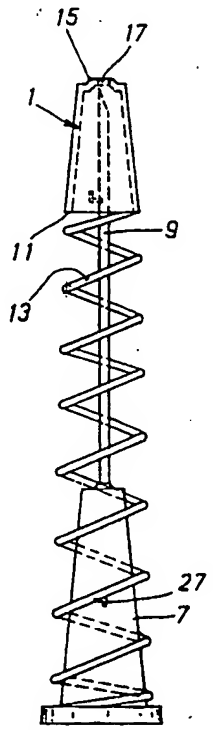

(57) Abstract

A hypodermic needle provided with a protection device against infection risks, substantially comprising a cap (1), or a hollow member shaped like a cylinder or a truncated cone, with piercing-resistant walls (3) having an inner irregular profile (5), which member can be snap-secured to the base (7) supporting the needle (9), and provided at its base (7) with a resilient element (13) formed like a coil or sheat and exhibiting a marked propelling capability, and with a preferably eccentric hole (17) at the tip (15) thereof.

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"A HYPODERMIC NEEDLE WITH PROTECTION DEVICE"

The present invention relates to a hypodermic needle with a device for protecting against the risks of infection.

It is known that the presently used hypodermic needles for sanitary use have not substantially changed compared with the commonly known type.

As a matter of fact some attempts have been carried out in order to prevent the needle from infecting a handler after the use of the hypodermic needle, but in practice they did not get the success they perhaps deserved, so that things are still in the well known initial state.

The only true realty is that at present in almost all cases disposable syringes and needles are used, i.e. adapted for just one use and properly protected before their using by suitably sterilised packagings, but not protected after use.

An object of the present invention is to overcome this drawback by providing a hypodermic needle which is easy and practical to be used and nevertheless equipped with an effective device for the protection against infection.

The protection device substantially comprises a cap or a hollow member having a cylindrical or truncated cone shape, with piercing-resistant walls having an inner irregular profile snap-secured to a base supporting the needle, and provided at its base with a resilient element formed like a

coil or sheat with a marked propelling capability, and at the other end with a preferably eccentric hole.

Within the cap cavity there is provided a pocket, outwardly defined by the cap walls and inwardly by a pierceable metal foil, with such pocket containing an adhesive and air-hardening material, in case supported by a resilient spongy material.

Said adhesive and hardening material is to be understood as comprising a physical-chemical composition adapted to envelop the portion of the needle sticked thereinto after use, which occludes the hole and sets very quickly, so as to render the hypodermic needle no longer separable from the protection cap.

Said snap engagement of the cap to the needle supporting base provides three main different embodiments of the invention: a first manually operated one; a second which is semi-automatic; and a third one which is a fully automatic and actually preferred embodiment.

According to the first embodiment, the cap is locked onto the needle base by a series of cooperating snap retainers located on the inner wall of the cap and on the outer wall of the needle base mating the cap: a short manually imparted displacement of the cap causes the cap to be released from the base, and allows it to spring upward to wholly shelter the needle. It is to be understood that said displacement can even

be imparted with the needle still inserted in the skin, so that the cap is released and springs forward to shelter the exposed portion of the needle 9, and remains ready to wholly cover it, as soon as it will be extracted from the skin.

According to the second embodiment, the cap is retained by the needle base through a series of retainers provided with an inclined surface: the pressure applied by the skin to the needle cap while pricking lowers said cap with respect to its mating base, causing said locks to slide along said inclined surfaces, so that the cap is rotated with respect to the base and it is disengaged from said base. In said case, the sheltering of the needle by the cap is ensured after the prick has been executed.

According to the third and actually preferred embodiment of the invention, the cap is linked to the base of the needle by a lever device, pivotally secured to the wall of the base and cooperating with a recess in the wall of the cap; as soon as the needle is inserted into the skin, the fluid displaced by the syringe piston acts upon said lever element and causes it to rotate enough to disengage it from the recess provided in the cap, thus allowing the action of the cap propelling means.

The present invention will be now described with details with particular reference to the accompanying drawings, that are supplied as non limiting examples, in which:

Fig. 1 is a side elevation view of a hypodermic needle without the protection cap;

Fig. 2 is a side elevation view of a needle in accordance with the invention with the protection device in its retracted position;

Fig. 3 is a side elevation view of a needle in accordance with the invention with the protection device in its extended position;

Fig. 4 is a scrap side elevation view of the cross-sectioned cap showing some of its features;

Fig. 5 is an axial cross-section of the cap pertaining to an automatic-snap embodiment;

Fig. 6 is another axial section of the cap in accordance with another automatic-snap embodiment;

Fig. 7 is a diagram of the snap device for the manually operated system;

Fig. 8 is a diagram of the snap device for the semi-automatic system;

Fig. 9 is a schematic side elevation view of the needle with the protection device before the insertion into the skin;

Fig. 10 is a view similar to Fig. 9 showing the needle with the associated protection device just inserted into the patient's skin;

Fig. 11 is a view similar to Figures 9 and 10, showing the needle with the protection device just extracted from the

patient's skin.

As clearly shown in the Figures, the subject protection device of hypodermic needles for preventing infections substantially comprises a cap or hollow member shaped like a truncated cone, with piercing-resistant walls 3, having an inner irregular profile 5, which member can be snap-secured to a base 7 supporting the needle 9, and provided at its base 7 with a resilient element 13 formed like a coil or sheat, and exhibiting a marked propelling capability, and with a preferably eccentric hole 17 at the tip 15 thereof.

Inside the cavity 19 of the cap 1 there is provided a pocket 21, outwardly defined by the cap walls 3 and inwardly by a pierceable metal foil 23, with such pocket containing an adhesive and air-hardening material 25, in case supported by a resilient spongy material.

This adhesive and air-hardening material 25 is to be understood as comprising a physical-chemical composition adapted to envelop the portion of the needle 9 sticked thereinto after use, which occludes the hole and sets very quickly, so as to render the hypodermic needle 9 no longer separable from the protection cap 1.

Said snap engagement of the cap 1 to the base 7 supporting the needle 9 provides three substantial different embodiments of the invention: the first is a manually operated one; the second is a semi-automatic one; andthe third is a

fullt automatic and actually preferred embodiment.

According to the first embodiment, the cap 1 is locked onto the needle base 7 by a series of cooperating snap retainers 27 (see Fig. 7) shaped like an upturned L, located on the inner wall of the cap 1 and on the outer wall of the needle base 7 mating the cap 1: a short manually imparted displacement of the cap 1 causes the cap to be released from the base 7, and allows it to spring upward to wholly shelter the needle 9.

Fig. 7 illustrates a sequence of the different retainer positions, respectively in a locked cap condition, in an unlocked cap condition and then in a completely released condition.

It is to be understood that the displacement can be imparted with the needle 9 still inserted in the skin, so that the cap 1 is released and springs forward to shelter the exposed portion of the needle 9, and remains ready to wholly cover it, as soon as it will be extracted from the skin.

According to the second embodiment, the cap 1 is retained by the needle base 7 through a series of retainers 29 (see Fig. 8), provided with an inclined surface: the pressure applied by the skin to the needle cap 1 while pricking lowers said cap 1 with respect to its mating base 7, causing said locks to slide along said inclined surfaces, so that the cap 1 is rotated with respect to the base 7 and it is disengaged

from said base. In this case, the sheltering of the needle by the cap 1 is ensured after the prick has been executed.

Fig. 8 illustrates a sequence of the different retainer positions, respectively in a locked cap condition, in an unlocked cap condition and then in a completely released condition.

According to the third and actually preferred embodiment of the invention shown by Figures 5 and 6, the cap 1 is linked to the base 7 of the needle 9 by a lever device 31 or 33, pivotally secured to the wall of the base 7 and cooperating with a housing recess 35 in the wall 3 of the cap 1; as soon as the needle 9 is inserted into the skin, the fluid displaced by the syringe piston acts upon said lever element 31 or 33 and causes it to rotate enough to disengage it from the recess 35 provided in the cap, thus allowing the action of the cap propelling means 13.

In Figures 9, 10 and 11 there are schematically illustrated the steps of a pricking carried out with a needle 9 equipped with the protection device shown by Fig.s 5 and 6.

Fig. 9 clearly shows the needle 9 and the associated protection device 1 locked together with the spring 13 compressed.

As soon as the pricking begins (Fig. 10) and the piston moves, the lever device 31 or 33 becomes disengaged thanks to the flow of the liquid inside the syringe, so that the device

31 or 33 snaps and releases the spring 13 which in turn causes the cap 1 to shift forward until it abuts against the patient's skin.

At the end of the pricking (Fig. 11) the needle 9 is extracted from the skin and the spring 13 urges the cap 1 to completely shelter the piercing tip of the needle 9.

C L A I M S

1. A hypodermic needle with an after-use protection device against infection risks, characterized in that it substantially comprises a cap (1) or a hollow member having a cylindrical or truncated cone shape, with piercing-resistant walls (3) having an inner irregular profile (5), said cap being snap-secured to a base (7) supporting the needle (9), and provided at its base (7) with a resilient element (13) formed like a coil or sheat with a marked propulsive capability, and at the other end (15) with a preferably eccentric hole (17).

2. A hypodermic needle as claimed in claim 1, characterized in that inside the cavity (19) of the cap (1) there is provided a pocket (21), outwardly defined by the cap walls (3) and inwardly by a pierceable metal foil (23), said pocket containing an adhesive and air-hardening material (25), in case supported by a resilient spongy material.

3. A hypodermic needle as claimed in claim 2, characterized in that said adhesive and hardening material (25) comprises a physical-chemical composition adapted to envelop the portion of the needle (9) sticked thereinto after use, which occludes the hole (17) thereof and sets very quickly, so as to render the hypodermic needle (9) no longer separable from the protection cap (1).

4. A hypodermic needle as claimed in claims 1 to 3, characterized in that the cap (1) is locked to the base (7) of the needle, by a series of cooperating snap retainers (27) located on the inner wall of the cap (1) and on the outer wall of the needle base (7) mating the cap (1) whereby a short manually imparted displacement of the cap (1) causes the cap to be released from the base (7), and allows it to spring upward to wholly shelter the needle (9), with said displacement that can be imparted even with the needle (9) still inserted in the skin, so that the cap (1) is released and springs forward to shelter the exposed portion of the needle (9), and remains ready to wholly cover it, as soon as it will be extracted from the skin.

5. A hypodermic needle as claimed in claims 1 to 3, characterized in that the cap (1) is retained by the base (7) of the needle (9) through a series of snap retainers (29) provided with an inclined surface whereby the pressure applied by the skin to the needle cap (1) while pricking lowers said cap (1) with respect to its mating base (7), causing said locks (29) to slide along said inclined surfaces, so that the cap (1) is rotated with respect to the base (7) and it is disengaged from said base (7), with the sheltering of the needle by the cap (1) being ensured after the prick has been executed.

6. A hypodermic needle as claimed in claims 1 to 3,

characterized in that the cap (1) is linked to the base (7) of the needle (9) by a lever device (31 or 33), pivotally secured to the wall of the base (7) and cooperating with a recess (35) in the wall (3) of the cap (1) whereby as soon as the needle (9) is inserted into the skin, the fluid displaced by the syringe piston acts upon said lever element (31, 33) and causes it to rotate enough to disengage it from the recess (35) provided in the cap (1), thus allowing the action of the cap propulsion means (13).

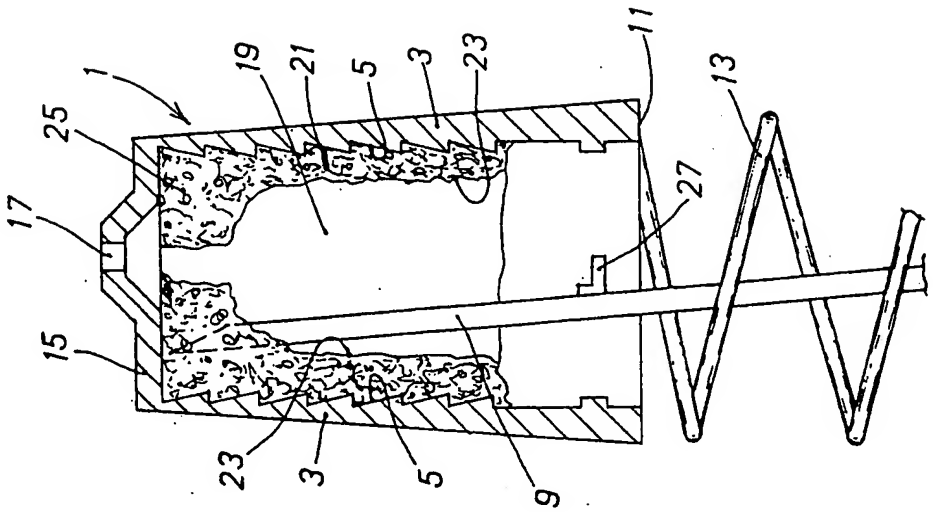

FIG.4

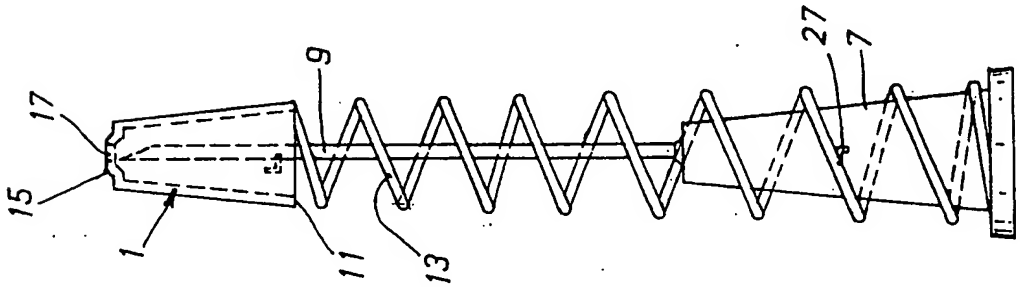

FIG.3

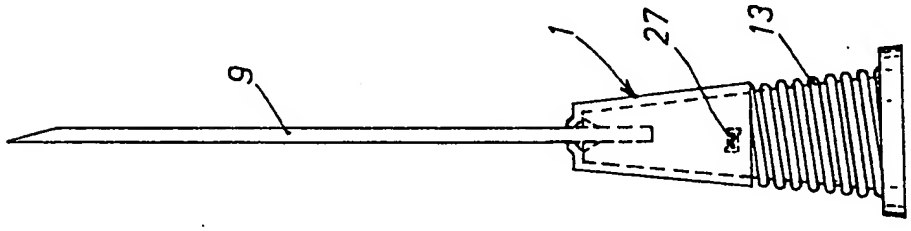

FIG.2

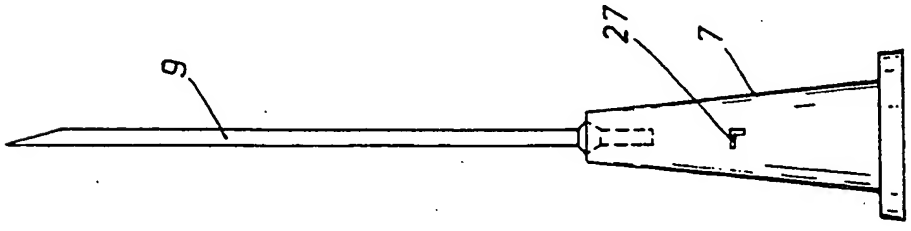

FIG.1

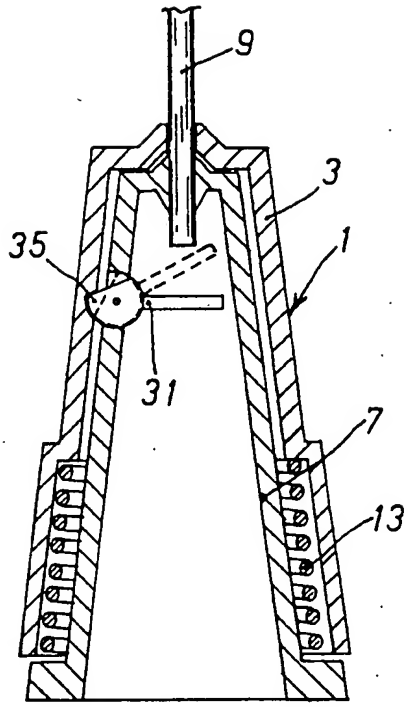

FIG.5

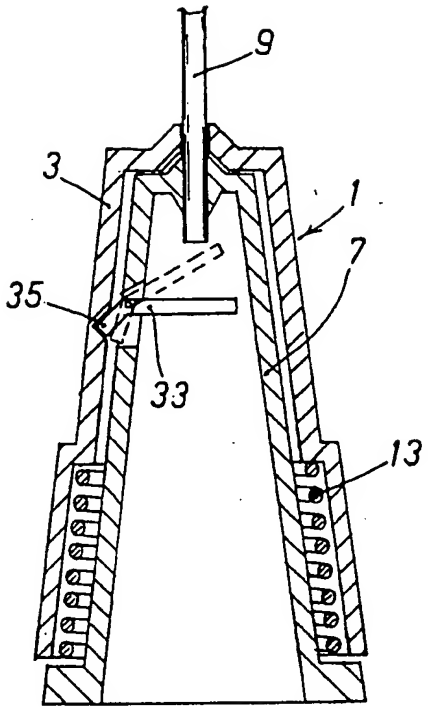

FIG.6

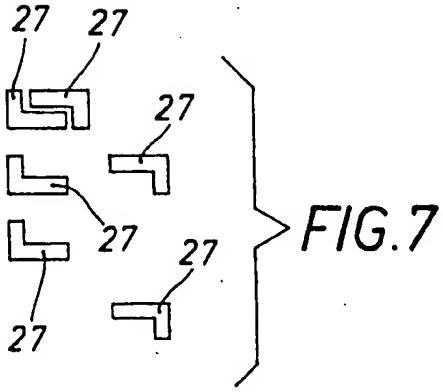

FIG.7

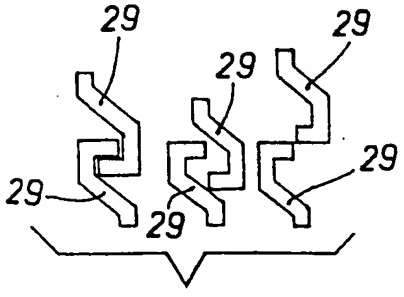

FIG.8

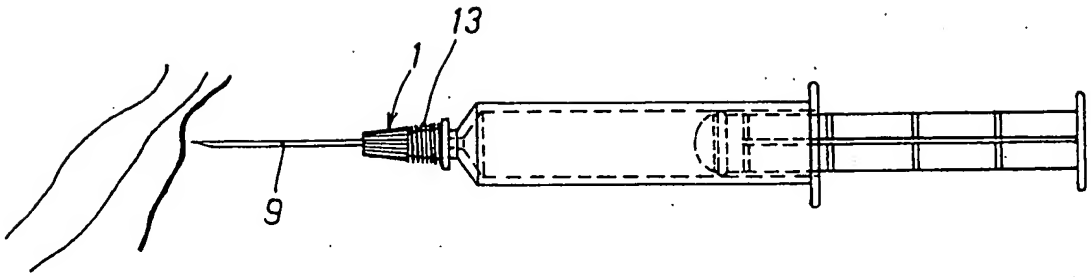

FIG.9

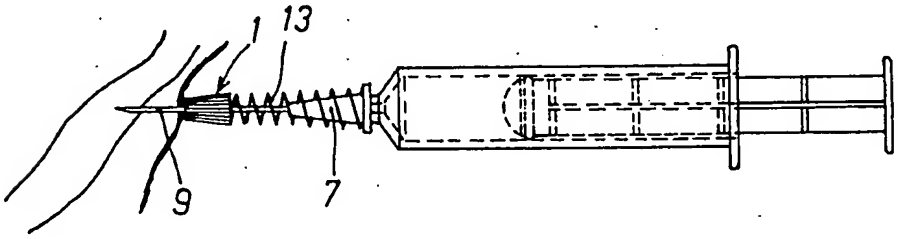

FIG.10

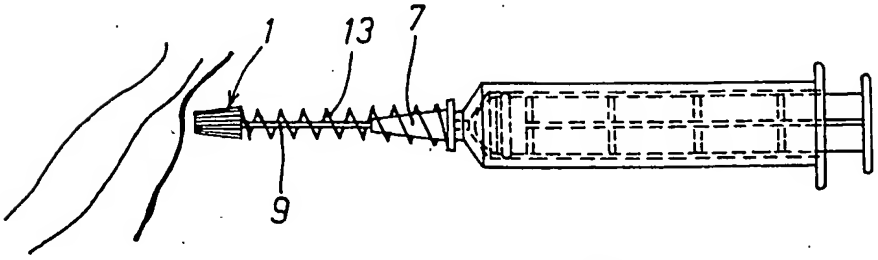

FIG.11

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 93/01619

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A61M5/32; A61M5/50

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A61M

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	WO,A,8 910 767 (DEEKS) 16 November 1989 see page 7, line 6 - page 9, line 6 see figures 7-10	1

X	US,A,4 725 267 (VAILLANCOURT) 16 February 1988 see column 6, line 44 - column 7, line 36 see figures 1A-2C	1
Y		2-4

Y	US,A,4 728 321 (CHEN) 1 March 1988 see column 2, line 4 - line 39 see figures 2,3	2-4

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
05 OCTOBER 1993	08. 10. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	SCHOENLEBEN J.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 409 180 (COMERCIAL MARIAE) 23 January 1991 see column 2, line 25 - column 3, line 50 see figures 6-9	5
A	WO,A,9 003 815 (STERIMATIC HOLDINGS LTD) 19 April 1990 see page 5, line 14 - page 9, line 15 see figures 1,2	5
A	EP,A,0 414 536 (RIKER LABORATORIES) 27 February 1991 see column 5, line 13 - line 27 see figures 1,2	6